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Edited by
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The Evolution of the Cane Planter.

By NORMAN J. KING.

AMONG the many implements devised by Queensland cane growers to overcome labour shortages and to lighten the burden of field work the cane planter is worthy of special mention. The stern force of circumstance has, in the past, obliged the growers to seek as many labour-saving devices as possible, so as to remain and exist in the industry. To plant cane by any other means than an up-to-date machine would not be considered by the grower of to-day and it is difficult to appreciate that in the early decades of the century hand planting was the rule rather than the exception. With the departure of Kanaka labour and the establishment of the industry on the basis of the small owner-grower many of the labour-wasting methods of the past had, perforce, to be discarded. Cane planting was, in those early days, a manual operation and it was one of the first to receive the attention of inventive growers.

In the very early period of cane growing "scrub" lands were cleared by falling the timber and burning off. This procedure left all the stumps and roots in the ground, and, in consequence, ploughing was not possible. To avoid the expense of removing these softwood residues, cane was planted by the method known as "cane-holing" whereby holes some fourteen inches by nine, and six inches deep were dug with a mattock, and one or two cane setts placed therein and covered with soil. The cane-holing was carried out in rows, gaps being left where stumps or logs interfered.

By the time a couple of ratoon crops had been grown most of the stumps had rotted away and the remainder could be easily grubbed out. A further fire left most of the ground ready for ploughing.

As soon as cultivation was practicable on stump-free land, planting was done by opening furrows with a double mould-board drill plough. Cane setts, previously cut into suitable lengths were then dropped in the furrow by hand and subsequently covered by soil. It was for the purpose of eliminating this laborious practice that the machine planter was invented. Sugar cane is a heavy crop and the "seed" requirements of an acre of land are as high as two and a-half tons. It is readily appreciated therefore that the hand method was laborious in the extreme besides being highly time-consuming.

FIG. 23.—First plantings on scrub land were made after scrub felling and burning. Cane plants were laid in "cane-holes" among the stumps.

FIG. 24.—Hand planting after opening drills. The setts were covered by a hoe or a horse-drawn implement.

FIG. 25.—An early "drop-planter." It was necessary for the drills to be opened prior to the passage of the planter.

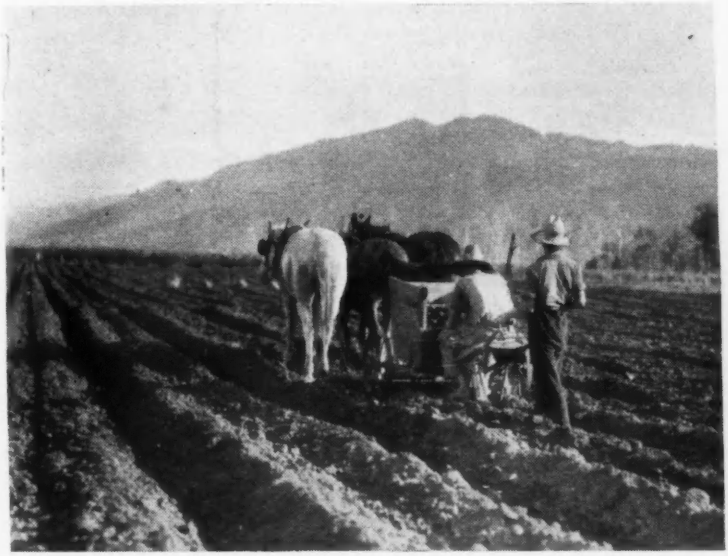

FIG. 26.—Another type of "drop-planter" still in use on smaller farms. Fertilization was a separate operation.

FIG. 27.—This "drop-planter" has a fertilizer attachment which supplies fertilizer in the drill with the cane plant.

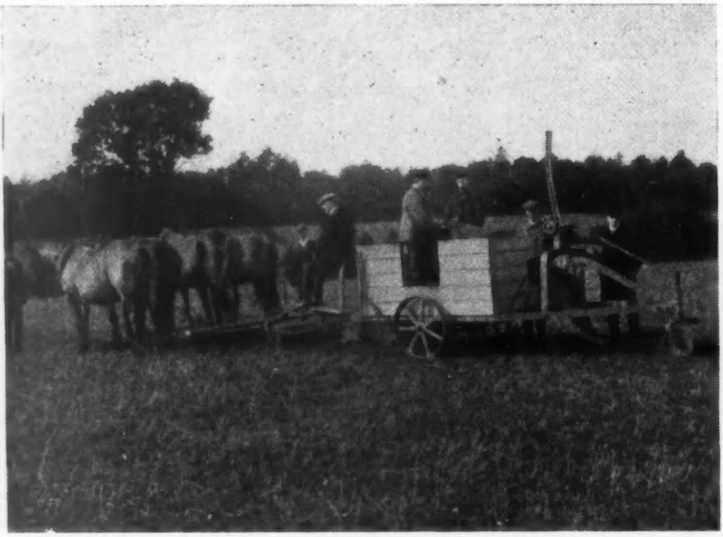

FIG. 28.—One of the elaborate cane planting machines designed by an English firm. It was reversible and incorporated a roller for soil compaction around the setts.

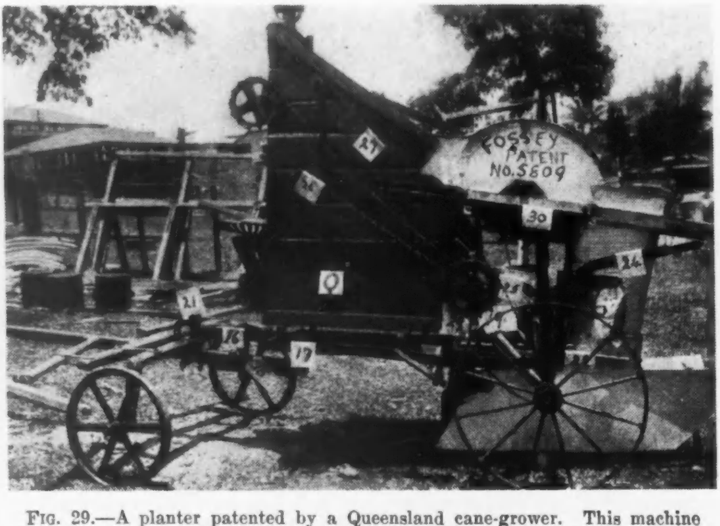

FIG. 29.—A planter patented by a Queensland cane-grower. This machine was too elaborate and possessed too many moving parts.

FIG. 30.—One of the first cutter-planters. This type is widely used to-day.

FIG. 31.—Showing the operation of the cutter-planter above. The stalks are fed into a central chute where they are cut into setts.

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FIG. 32.—Another type of cutter-planter in which the stalks stand upright in racks.

The earliest planters were simple affairs, consisting of a box on wheels with a chute for passage of the plants, and drawn by two horses. The planter straddled the previously made drill, and the operator dropped the plants down the chute so that they lay in the bottom of the furrow. Covering with soil was an extra operation. By this means the growers solved the problem of carrying heavy bags of plants but the operation was still a very time-consuming one.

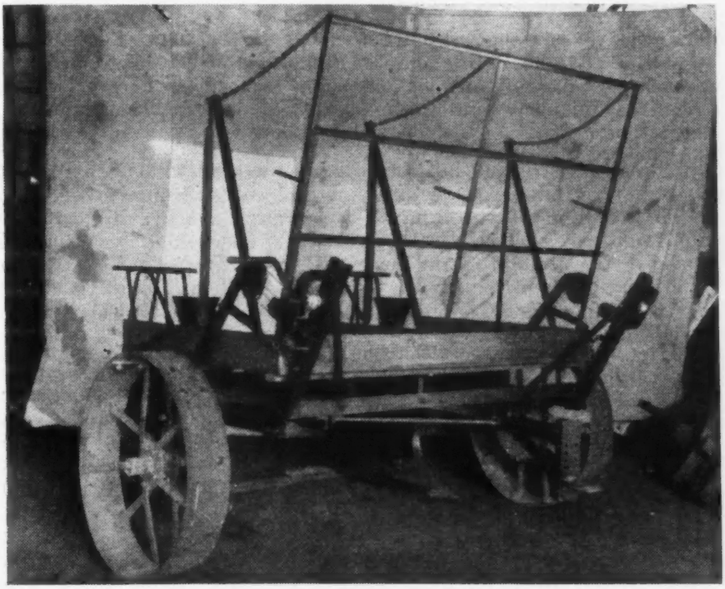

Fig. 33.—The double row cutter-planter—the most modern development of this implement.

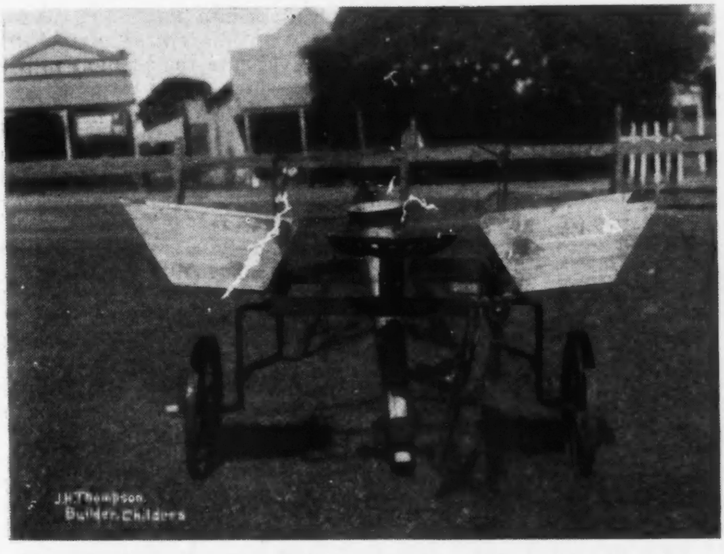

Fig. 34.—An early type of "miss-planter." This simple and efficient implement never became popular.

Later improvements incorporated a foot and two mould-boards which pushed back the soil on both sides of the furrow and allowed it to fall in on top of the plant as the planter moved along. This improvement plus the addition of chains to drag in more or less soil as required did away with the necessity for covering the plants by a separate operation.

With these early machines fertilizing was somewhat of a problem. Distribution by hand was the only method available in the early days but the invention of the vibrator-type machine made it possible to apply mixtures mechanically. This was carried out by using the vibrator in the bottom of the furrow prior to the passage of the cane planter. Later improvements incorporated the fertilizer distributor in the planting machine thus allowing both operations to be carried out simultaneously.

After the early inventions of simple cane planters there came a period of elaboration during which many complex and cumbersome machines were patented but for a considerable period the simplest types were favoured. In later years it was considered desirable, for the purpose of further mechanisation, to combine the operations of making furrows and planting. Planters were accordingly built to make drills, plant the cane and apply a soil cover; to make the operation complete, fertilizer distributors were attached to allow placement of fertilizer at plant depth. The extra draft of these implements made it necessary to use tractor power and before long larger estates were using this type of machine to plant two rows simultaneously.

In the 1930's the first cutter-planter made its appearance, and claims were made for the new implement on the grounds of the saving in labour and time. With the conventional drop planter, cane has to be cut, stripped, and topped in the field, then cut into plants and the bags of plants transported to the planter. With the cutter planter, the topped and stripped stalks are loaded direct into the planter and the operator feeds the stalks into a chute in which a reciprocating knife cuts plants, the length of which can be adjusted.

In the earlier types the stalks of cane were stacked on the floor of the planter in a horizontal position, but other modifications had racks in which the stalks were placed almost vertically. Fertilizer distributors can be attached to either type. The saving in labour was quickly appreciated and was made evident by the immediate popularity of these machines. Several types are manufactured by sugar district implement firms and double-row cutter planters are available for large holdings.

It is a far cry from the early primitive methods to the modern cutter planter but the transformation has taken place within a relatively short space of time. A great deal of credit is due to the inventive genius of the Queensland cane growers and implement makers who have brought cane planting to a higher stage of perfection than in any other sugar-producing country. As in most fields of human endeavour, the improvements have been the result of labour shortages or the effort to keep down rising production costs. There would appear to be little chance of further startling advances in this particular field, but there are many other field operations still offering scope to the inventive mind.

The Effect of Variations in Rainfall on C.C.S. in High Rainfall Areas.*

By L. G. Vallance.

Introduction.

THE cane growing centres of Babinda, Innisfail and Tully fall within the highest rainfall areas of Queensland's sugar belt. The average monthly rainfalls are as shown in Table I., which indicates that the average total rainfall figures for the three areas are respectively 166, 143 and 181 inches approximately. A very wet season from midsummer to early autumn is characteristic and it is not unusual for the rains to be prolonged through April into early May. Winter and early spring months are moderately dry, and with rising temperatures towards the latter part of this period deficiencies in soil moisture may be encountered.

TABLE I.

Average Monthly Rainfalls (points).

—	January.	February.	March.	April.	May.	June.	July.
Babinda	2,450	2,780	3.138	2,150	1,354	882	523
Innisfail	2,024	2,307	2,681	2,021	1,239	741	475
Tully	2,835	3,272	3,350	2,144	1,592	981	640

—	August.	September.	October.	November.	December.	Total.	Number Years.
Babinda	428	462	479	688	1,283	16,617	35
Innisfail	485	352	312	625	1,088	14,350	66
Tully	593	476	462	771	955	18,071	21

Planting commences as soon as possible after the wet season, and normally the greater part of the areas is planted before the commencement of the crushing in June or July. In general the age of the crop at harvest ranges approximately from twelve to fifteen months. Ratooning is widely practised and it is usual for the crop to go to the second ratoon stage before replanting. The sugar content of the cane is moderately good and the means of the average seasonal C.C.S. figures for representative mills for the twelve years prior to 1949 range from 14·2 to 15·1. However, the records indicate that a considerable fluctuation may occur from year to year; some crushings are characterised by good C.C.S. values, while in others the values are appreciably lower.

Undoubtedly there are many factors which influence the sugar content of cane since varietal, physiological, nutritional and climatic influences are of major importance. Notwithstanding the many factors involved, however, it seemed not unlikely that rainfall in these wet areas might exert an over-riding influence. The selection of Babinda, South Johnstone and Tully for examination introduces a note of homogeneity from the point of view of similarity of soil types, general farm management practices, and the dominance of Badila planting.

* Paper presented at the Cairns Conference Q.S.S.C.T., April, 1950.

Admittedly a host of possibilities comes to mind with regard to the influence of the other variants, but in the overall picture within these three mill areas there is some justification for treating them as being sensibly constant.

Data Obtained.

Effect of January-February Rainfall.—The late summer months of January and February are characterised by very heavy rainfall, the average precipitation during each of these months being exceeded only by that during March. During the period under review (1937-1948) the mean precipitation values for these two-monthly periods were 58·3, 47·8 and 58·0 inches for Babinda, Innisfail and Tully, respectively. No significant relationship could be found between the January-February rainfall and the true average C.C.S. figures for the various seasons for Babinda and South Johnstone. The correlation coefficients are ·2637 and ·2430. For Tully, however, the correlation is just significant ($r = \cdot 5761$) and positive, thus indicating that within limits an increase in precipitation possibly causes a rise in the seasonal average sugar content of the cane. It is noticeable that all three coefficients are positive.

Effect of March-April-May Rainfall.—The total rainfall for the autumn months of March, April and May was compared with the true average C.C.S. figures obtained during the crushing season commencing in June and extending to the end of the year. The years considered were from 1937 to 1948 inclusive. The following correlation coefficients were obtained:—

Babinda	$r = -\cdot 026$	(not significant)
South Johnstone ..	$r = -\cdot 114$	„ „
Tully	$r = \cdot 341$	„ „

Quite evidently, in these three mill areas, variations in rainfall within the range studied, *i.e.,* 24 to 130 inches, have no effect on the average C.C.S. figure for the season immediately following. Apparently therefore, a late or extended wet season does not have any overall effect on the average sugar content of the cane for the season.

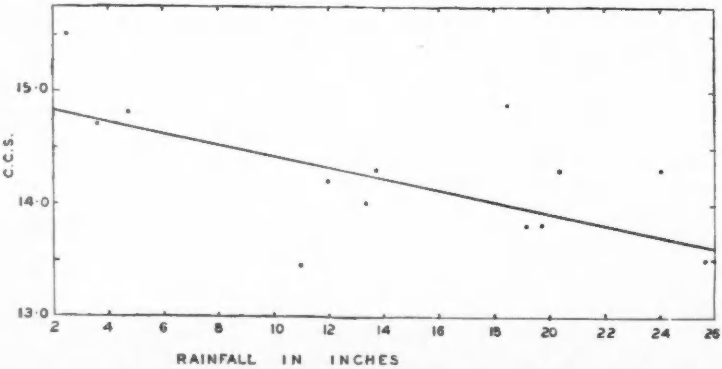

FIG. 35.—Illustrating the calculated relationship between seasonal C.C.S. and the June-July rainfall for Babinda.

Effect of June-July Rainfall.—For the Babinda area there is a significant correlation between June-July rainfall and the average seasonal C.C.S.. The coefficient is negative and significant at the 2 per cent. level (r = —·6709), thus indicating that with increased rainfall a drop occurs in C.C.S. The coefficients for South Johnstone (r = —·4700) and Tully (r = —·3353), while not significant, are also negative.

Effect of August Rainfall.—The correlations for the same years are significant for South Johnstone (r = —·6100) at the 5 per cent. level and significant at the 1 per cent. level for Tully (r = —·8214). In the case of Babinda the coefficient is not significant (r = —·512), but is still negative.

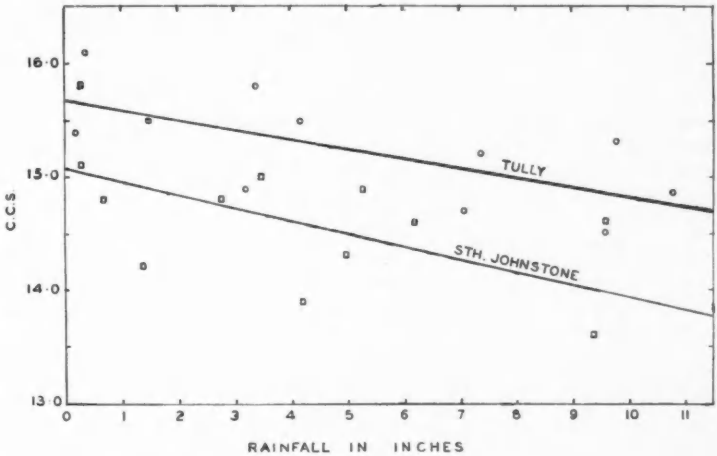

FIG. 36.—Illustrating the calculated relationships between seasonal C.C.S. and the August rainfall for South Johnstone and Tully.

Effect of September Rainfall.—No significant relationships were obtained between average seasonal C.C.S. and rainfall for the month of September, using the figures for the period under review. The coefficient for Babinda become positive (r = ·2334), while those for South Johnstone (r = —·396) and Tully (r = —·356) were negative.

Discussion.

The correlations obtained between the seasonal C.C.S. values and the various rainfall groupings are shown in Table II. The outstanding features are the adverse effect of the June-July rainfall at Babinda and the August rainfall in the South Johnstone and Tully areas. The coefficients, —·6709, —·6100 and —·8214, are all definitely significant.

The regressions of y (C.C.S.) on x (rainfall) for these periods are as follows:—

Babinda	$y = 14{\cdot}93 - {\cdot}05x$	(1)
South Johnstone	$y = 15{\cdot}07 - {\cdot}11x$	(2)
Tully	$y = 15{\cdot}71 - {\cdot}09x$	(3)

TABLE II.

Correlation Coefficients for Seasonal Average C.C.S. and Rainfall.

Period.	Babinda.	South Johnstone.	Tully.
January–February	+·2637	+·2430	+·5761
March–April–May	—·026	—·114	+·341
June–July	—·6709	—·4700	—·3353
August	—·512	—·6100	—·8214
September	—·2334	—·396	—·356

·5760 is significant at 5 per cent. level. ·7079 is significant at 1 per cent. level.

The regression coefficients (—·05, —·11, —·09) are closely similar and all are negative. It is apparent that within the rainfall limits examined an increase in the June-July rainfall at Babinda and August rainfall at South Johnstone and Tully brings about a decrease in average C.C.S. values for the season. This decrease is of the order of ·05, ·11 and ·09 units of C.C.S. per inch of rainfall in the three areas respectively. Actually at Babinda this effect probably persists into the following month, *i.e.*, August, although the value of the coefficient is somewhat less than that required for significance.

In Fig. 1 the regression line showing the calculated relationship between seasonal C.C.S. and June-July rainfall is shown for Babinda. Similarly, the relation between seasonal C.C.S. and August rainfall in the South Johnstone and Tully areas is shown in Fig. 2. The slope indicates a decrease in C.C.S. with increased rainfall and a marked similarity is evident in both figures. At the same time the individual seasonal C.C.S. values for each season from 1937 to 1948 inclusive are plotted against the rainfall recorded during the relevant period for the corresponding year. These points are closely scattered about the calculated regression line.

TABLE III.

Difference between Actual Seasonal Average C.C.S. and Theoretical C.C.S. calculated from Rainfall Figures (using June–July Rainfall for Babinda and August Rainfall for South Johnstone and Tully).

Year.	Differences in C.C.S. (actual minus calculated)		
	Babinda.	South Johnstone.	Tully.
1948	−0·1	−0·2	−0·4
1947	−1·0	−0·4	−0·1
1946	+0·7	+0·8	+0·4
1945	−0·3	−0·7	−0·5
1944	+0·6	+0·2	+0·5
1943	+0·1	+0·1	−0·3
1942	−0·1	−0·7	−0·4
1941	0·0	0·0	+0·2
1940	+0·4	+0·3	+0·4
1939	−0·1	−0·2	−0·1
1938	−0·2	+0·6	0·0
1937	+0·1	+0·4	+0·2

As a matter of interest the theoretical C.C.S. values have been calculated from the June-July rainfall in the case of Babinda and the August rainfall for South Johnstone and Tully by using the equations (1), (2) and (3). The differences between these and the actual average C.C.S. values for the various years are shown in Table III. In the majority of cases there is little difference between the C.C.S. predicted by the above formulae and that actually recorded.

It was not possible to show that variations in late summer (January-February) and autumn (March-April-May) rains had any effect on the season's average C.C.S. A possible exception is the effect of the January-February rainfall at Tully, where the figures suggest that an increase in rainfall will increase C.C.S. values. The reason why this should be so in this area alone is not clear.

Summary.

An examination has been made of the effect of rainfall on average seasonal C.C.S. values in the Babinda, South Johnstone and Tully areas. In the former area the June-July rainfall has a significant effect on the sugar content of the cane. At South Johnstone and Tully there is a significant correlation between C.C.S. and rain falling during the month of August. In all three cases the correlation is negative, *i.e.*, the C.C.S. decreases with an increase in rainfall. This decrease is of the order of 0·05, 0·11 and 0·09 units of C.C.S. per inch of rainfall for Babinda, South Johnstone and Tully within the limits of rainfall recorded during the period under review, *i.e.*, 1937-1948 inclusive.

In general variations in late summer and autumn rainfall do not affect the C.C.S. figures for the season immediately following. This possibly does not hold for Tully, since there are indications that increases in late summer rains may increase the average seasonal C.C.S. figures.

Acknowledgment.

The author is grateful to Mr. P. McGovern, Biometrician, Division of Plant Industry, Department of Agriculture and Stock, for his advice and criticism during the preparation of this paper.

SUGAR BUREAU ANNIVERSARY BROCHURE.

The year 1950 marks the fiftieth anniversary of the foundation of the Bureau of Sugar Experiment Stations and the event has been marked by the publication of a special brochure.

The booklet traces the events leading up to the passing of "The Sugar Experiment Stations Act of 1900," the subsequent establishment of Experiment Stations, the staff movements involved and the steady development of the organisation. Separate sections describe the advances made in soil technology, agriculture, pest and disease control, cane breeding and mill technology. Graphs and tables are appended to illustrate improvements made in production and efficiency. The booklet provides an interesting historical record and will be made available, free of charge, to any cane grower or mill staff member who makes application for it. N. J. K.

Varietal Changes in the Cairns District 1933-49.*

By J. H. Buzacott.

Introduction.

THE Cairns cane growing district is generally regarded as comprising the areas which supply cane to the Hambledon, Mulgrave and Babinda Mills. These are all large mills and in the peak year of 1936 the combined crushing reached almost 900,000 tons. From the varietal viewpoint, Mulgrave and Hambledon have much in common, whereas Babinda is representative of a somewhat different class of country. However, it has been considered desirable to group these three, since they are located in a 40-mile strip of coastal area and are all served by the Cairns Cane Growers' Association.

Varietal Changes.

The varietal position at both Mulgrave and Hambledon was affected to a considerable extent by the occurrence of gumming disease. In the former mill area a serious outbreak occurred in the year 1934, whilst in the latter an outbreak followed in the year 1939. These led to the imposition of quarantine measures against certain major varieties of cane, notably S.J.4 and Clark's Seedling. The widespread incidence of downy mildew in the Mulgrave area during 1937 led also to restrictions on the planting of certain varieties. Fortunately, however, in this instance none of the major varieties was affected, and in consequence the varietal position was not markedly altered by this disease.

The accompanying graph (Fig. 1) shows the varietal changes which have occurred in this far northern section of the State during the 17 years from 1933 to 1949.

In the Cairns district, as in most of the cane growing areas of North Queensland, Badila was the unchallenged favourite for a great many years. This variety constituted 64 per cent. of the total crop for 1933—in that year it comprised 78 per cent. of the Babinda harvest, whilst in both Mulgrave and Hambledon it provided over 50 per cent. of the crops. The percentage of Badila commenced to decline in 1944 with the appearance of Cato and Q.44, and the decline accelerated in 1948 when a serious challenge was thrown out by Trojan—a variety that had previously attained fame on the Herbert River. By the 1949 crushing the proportion of Badila had fallen to 30 per cent. of the total crop. The greatest change occurred in the Hambledon area, where Badila supplied only 9 per cent. of the 1949 crop, whilst in Mulgrave it provided 28 per cent. and in Babinda it still produced 51 per cent. of the crop. The proportion of Badila will probably not fall greatly below 30 per cent. until a cane better suited to the Babinda area is produced.

The percentage of Clark's Seedling (H.Q.426) did not vary greatly from 1934 until 1947. Its disappearance from the Hambledon crushing in 1942 and the Mulgrave crushing in 1943 was offset by an increase in the amount grown in the Babinda district. Since 1934 Clark's Seedling has never been responsible for more than 10 per cent. of the total crop,

* Paper presented at the Cairns Conference Q.S.S.C.T., April, 1950.

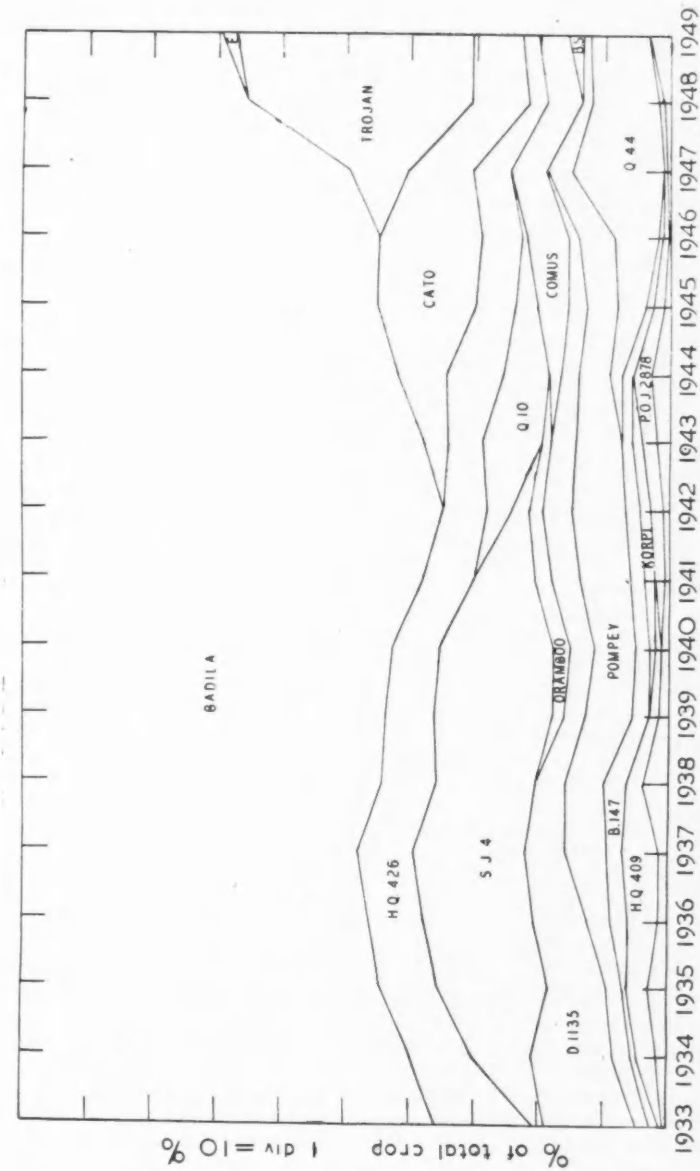

Fig. 37.—Illustrating the varietal changes in the Cairns district, 1933-49.

but due to its early maturing qualities it has always been favoured for a portion of the plantings. Although the area growing this cane fell considerably in 1948 and 1949 there may be a slight rise in future owing to its reapproval in the Mulgrave district. However, due to its poor ratooning qualities, it is anticipated that it will never become very popular. Clark's Seedling was bred at Hambledon, North Queensland, in 1902 by the Colonial Sugar Refining Company, and it is a remarkable tribute to its value as a useful variety that it has survived for almost fifty years.

S.J.4 achieved a rapid rise in popularity from 1933 to 1935, particularly in Mulgrave and Hambledon. The outbreaks of gumming disease in Mulgrave during 1934 put an effective check to further plantings in that area, whilst Hambledon's outbreak of 1939 caused further restriction there. Due to its low sugar content S.J.4 never became popular in the Babinda district, and consequently the variety had disappeared from the list of crushings by 1944. During its peak years 1935-1940, S.J.4 constituted almost 20 per cent. of the total crop of the three mills, and in 1940 provided 43 per cent. of Hambledon's crop.

The Demerara variety D.1135, which was introduced into Queensland by Messrs. Young Brothers of Fairymead in 1895, constituted a considerable proportion of the poor land crop until 1934, since when it has gradually declined in importance. Its chief value lay in the fact that it possessed some degree of grub resistance and farmers of the dry "grubby" lands almost invariably planted D.1135 after they had received a severe setback with other varieties. Its low sugar content, lodging habit and poor cover prevented it from competing with modern varieties. In 1949 only 0.1 per cent. of the crop was represented by D.1135, and this amount is too small to show on the graph.

Pompey is another variety which, like Clark's Seedling and Badila, was represented in the total crushing in every year from 1933 to 1949, although grown almost exclusively in the Hambledon area. It supplied only 2 per cent. of the harvest in 1933, but gradually increased in importance with the banning of S.J.4 until in 1942 it represented 8 per cent. of the crop. Since then, due mainly to its generally low sugar content and limited period of maturity, it gradually declined in importance and has largely been replaced by Comus, Cato and Q.44. B.147 was a special purpose cane which provided a small percentage of the crushing for many years. It was introduced from Barbados in 1898 by the Queensland Acclimatisation Society, and in the same year by Messrs. Young Brothers of Fairymead, but it did not attain much popularity until the middle nineteen thirties, when it showed considerable resistance to flood on the river flats of Mulgrave and Babinda. On those flooded areas plantings were maintained until 1947, since when the variety has practically vanished, due to harvesting disabilities.

H.Q.409 achieved a short burst of popularity between 1933 and 1938, due to an alleged capacity for flood resistance. Following the 1934 gum outbreak in Mulgrave its propagation was encouraged on account of its resistance to gumming disease, but its unreliable germination and indifferent ratooning militated against its greater extension and by 1942 the amount of H.Q.409 in the area was negligible.

The two New Guinea canes, Oramboo and Korpi, were grown very little in the Cairns district prior to 1938. Their high degree of resistance to gumming disease and their high sugar content encouraged a few

farmers to try small plantings. Finally the susceptibility of Oramboo to leaf scald disease, coupled with its poor ratooning powers and Korpi's indifferent germination and ratooning, caused both to fade from the picture by 1945.

The Java Wonder cane, P.O.J.2878, shortly after its introduction to Queensland in 1928, was tested in the northern districts. It was mainly tried on the better soils and under these conditions produced thin sticks and indifferent crops. However, on some of the forest soils it gave satisfactory returns and as a result of the outbreak of gumming disease its further propagation on the highlands of the Mulgrave district showed that it was useful as a stop-gap variety. Its susceptibility to downy mildew was responsible for its decline, but it has continued to contribute a small tonnage to the Mulgrave crop—it accounted for only 0.9 per cent. of that mill's crushing in 1949, and 0.3 per cent. of the total Cairns crop.

The rapid germination and ratooning of Q.10, coupled with the fact that it would produce a crop in the absence of fertilizer, led to the propagation of this variety during the war years when fertilizer was in very short supply. In 1943 Q.10 represented 9 per cent. of the total crop, but its tendency to lodge when growth conditions were good and its disappointing yields soon led to its extinction when fertilizer supplies improved and better varieties became available. Shortly after Q.10 made its appearance on the approved lists Cato, a Badila x Q.813 seedling bred by the C.S.R. Co., was approved, and this variety made rapid headway. In 1945 and 1946 Cato represented over 15 per cent. of the total crop. In these two years it constituted more than 30 per cent. of the Hambledon crop and was well ahead of Badila. However, poor ratoon crops on the dry areas, due largely to grub attack, caused the variety to lose favour with Hambledon growers. With the wide use of benzene hexachloride for the control of cane grubs it seems likely that this variety with its valuable cropping capacity and ease of harvesting may soon regain favour.

Comus, which originated in the Colonial Sugar Refining Company's Sydney nursery, is also a cane which has proved useful during recent years. Although it was first approved for planting in 1942, Comus did not achieve the popularity of Cato. Nevertheless, it has proved a valuable variety, particularly as late plant whilst it matures somewhat earlier than most of the varieties at present on the approved lists. Q.44, which was developed at the Northern Sugar Experiment Station, was not approved for planting until 1943, but it made a rapid rise to 14 per cent. of the total district crop for 1947. Because of its tendency to collapse after burning and its high susceptibility to leaf scald it has started to lose favour, and in 1949 represented 9 per cent. of the crop. Despite this, in the Babinda district, Q.44 still ranks third in popularity. This is due largely to its excellent cover and the consequent low costs of cultivation. Provided that it is confined to land on which the growth is not too rank it should continue to survive for some years.

The most important introduction to the Cairns district in recent years was that of Trojan, a variety bred by the Colonial Sugar Refining Company at Ingham in 1933. It was approved in 1945 and rose rapidly to prominence so that by 1949 it accounted for no less than 36 per cent. of the crushings for the district. In Hambledon almost 135,000 tons of Trojan (61 per cent. of the total crop) were crushed during the

latter year. Whilst giving excellent results on the wetter soils the ratoons have shown some tendency to fail on the dry sections, but this may have been due partially to light grub attack. It seems likely that Trojan has now reached its peak and the appearance of Pindar and Q.50 will probably reduce plantings of it in the future.

The only other varieties represented in the graph are Badila Seedling and Eros. The former has been grown for a number of years in the Babinda district, but has apparently not been listed separately. During recent months some growers have been taking a greater interest in it because it appears to produce better crops than Badila on the poor wet gravel soils at Babinda. There seems to be some indication that Badila Seedling possesses a greater degree of tolerance to chlorotic streak disease than Badila and this may account for its better performance on waterlogged soils. Eros, another variety bred by the C.S.R. Co., did not appear on the approved list until 1947, and thus it has had little time to become widespread. However, it is not anticipated that this variety will ever become of major importance. Admittedly it produces heavy ratoon crops with somewhat earlier maturity than many modern varieties, but the spreading habit of the young crop and its intense early arrowing will militate against its further extension.

New Varieties.

Two new varieties, Pindar and Q.50, were approved for planting in portion of the Cairns district during 1949. Pindar was bred by the C.S.R. Co. in 1937 and is a rapidly growing variety which will undoubtedly be widely planted in the next few years. Q.50, which was developed at the Mackay Sugar Experiment Station, shows great promise for the poorer lands of the district. It is expected to replace Q.44 to a large degree, since it has somewhat similar agricultural characteristics but is highly resistant to leaf scald.

TABLE I.
COUNTRY OF ORIGIN OF VARIETIES GROWN IN THE CAIRNS DISTRICT, 1933 AND 1949.

Country of Origin.	Percentage of Total Crop.	
	1933.	1949.
Queensland	14	62
New Guinea	64	32
West Indies	16	..
Fiji	2	1
Unclassified	4	5

Comus, which was raised first at Sydney and later at Grafton, has been included under Queensland since the seed from which it was raised was produced at Macknade.

The Cairns district is in a particularly favourable position regarding new varieties. In addition to the trials with seedlings produced by the Bureau and with varieties introduced by that organisation from overseas, the C.S.R. Co. conducts trials in the Hambledon area with a number of new seedlings received each year from its Macknade nursery. From these three sources it is confidently anticipated that varieties capable of maintaining a high district yield will continue to be made available from year to year. Some indication of the swing from introduced canes to Queensland-bred varieties is given in Table I.

It seems likely that practically all future replacement varieties for at least the Hambledon and Mulgrave areas will be hybrids. Trojan, in addition to noble blood, contains Indian spontaneum blood, whilst Pindar and Q.50 are both mixtures of noble blood with Indian and Javanese spontaneums. A number of the new varieties produced at the Northern Sugar Experiment Station contain New Guinea robustum blood and some of these show considerable promise. It is recognised that the great need at the present moment is for early maturing varieties and several of these are at present undergoing tests. Certain noble canes have now been proved capable of producing early maturity even when hybridised with spontaneum, sinense, robustum, or other so-called "wild" species. This represents a considerable advance and the development of early maturing commercial varieties containing "wild" blood seems near accomplishment.

In the Babinda area the maturity of Trojan appears to be considerably delayed. This may well be due to the copious and extended rainfall in that district, and it remains to be seen whether other wild-blooded canes suffer the same diabiility. However, steps were taken a few years ago to establish a seedling raising sub-station in the Babinda district, and it is hoped that canes suitable for that area will be developed there in the near future.

Conclusion.

During each of the last two seasons the three mills of the Cairns district have produced approximately three-quarters of a million tons of cane. With the further extension of new high yielding varieties, the more stable fertilizer supplies and the more efficient control of diseases and pests, there should be no difficulty in maintaining production in excess of this figure.

THE MUNG BEAN.

During the past year or so a few cane growers in the Cairns and Innisfail districts have planted the Mung Bean (*Phaseolus mungo*) as a green manure crop. They acquired the seed under various names such as Soy Bean, Indian Pea and Mungo Bean. Actually the species is not related to Soy Bean at all and the correct vernacular name is either Mung Bean or Chinese Green Gram. Under the latter name the seed is used as a food by Orientals and, prior to the second world war, an appreciable quantity was imported to North Queensland as food for Chinese.

The seed is very easily identifiable since it is a deep green colour even when dry, almost spherical in shape, and about three-sixteenths of an inch in diameter.

Mung Bean appears better suited as a green manure crop, to the wetter areas of the North. On the relatively dry soil types of Mulgrave and Hambledon districts the cover is somewhat sparse. On the other hand, several good crops were seen in the wetter southern portion of Mulgrave district and at Innisfail. No wilt was observed on wet soil types and the variety appears to be resistant to this disease

A small amount of the seed is grown commercially in the Mareeba district.

J. H. B.

Ratooning in the Cairns District.*

BY G. BATES.

Introduction.

AGRICULTURAL practices change from time to time and methods which were revolutionary at one stage often become standard practice within a few years. It is not so many years ago that the most widely used method of ratooning in the Cairns area was to plough away from each side of a line of stools and allow the furrows to remain open for some time to "sweeten the ground." The interspaces were subsequently cultivated and the furrows made during ratooning were filled in by the use of the scarifier and middle buster. When it is remembered that these lines of stools were left exposed during some of the hottest and driest periods of the year one can well imagine the setback the young cane suffered by the drying out of this narrow strip of land. The one advantage this practice has to recommend it is that it encourages the development of shoots from well below the surface. This particular method of ratooning is perfectly safe under conditions of good soil moisture and consequently a large number of growers found it payable. For many years other farmers merely followed their example despite the fact that the soil conditions on their particular farms were entirely unsuitable for this type of cultivation. There are still a few who ratoon in this way but, generally speaking, it is only in the wetter areas that this practice persists.

Ratooning operations in North Queensland take place between July and December, which is the driest part of the year. The approximate average rainfall in inches for these months in the Cairns area over the past 60 years are as follows:—July, 1.53; August, 1.69; September, 1.65; October, 2.11; November, 3.87; and December, 8.46. Some portions of the district may receive rather less than this but, on the other hand, Babinda certainly receives more. Therefore, since the lack of soil moisture is one of the limiting factors in producing a good ratoon crop, it is necessary to conserve any moisture which may remain in the soil at the time of harvest. A further disadvantage is imposed by the almost universal pre-harvest burn which destroys the protective covering of trash, thus causing the soil to dry out very rapidly.

In the ratooning of cane the following points must be kept in mind:—

It is necessary to conserve any moisture that the land may hold at the time.

The soil must be in good tilth to receive and hold any rain that may fall and to allow of root development of the ratoon crop.

The stool must be kept in the ground and the development of strong ratoon shoots encouraged.

The ratoon crop is the one on which the grower can show the most profit. The cost of producing ratoons is much less than that of establishing a plant crop and growers are now eager to try out any operation which tends to give a higher yield in the ratoons.

* Paper presented at the Cairns Conference, Q.S.S.C.T., April, 1950.

Present Ratooning Practices.

The most widely used method of ratooning in the Cairns area is that which makes use of the grubber. After the burning of the cane tops, the land is disced, grubbed and then kept clean by means of the scarifier, cotton king, or other attachments to the high clearance tractor.

Disc Harrowing.—The use of the disc harrows after harvesting cannot be too highly recommended. It has a two-fold effect: it cultivates the surface, and thus provides a soil mulch, and it destroys the top eyes of the stool which in some cases favours the development of those from lower down. The discing of the stool thus corrects any faults of high cutting. However, it should be remembered that certain of the older varieties such as Q.10, H.Q.426, Oramboo, and Q.813 only ratoon from the top eyes and heavy discing is fatal to such a variety. The number of discings and the amount of cut will vary from farm to farm and variety to variety, and can only be determined by practical experience. It is of interest to note that the stubble shaver did not come into favour in the Cairns area. It has been tried, but did not suit the conditions of the soil and varieties of the district.

Discing should be carried out immediately after harvest. In the harvesting of burnt cane some tops are left on the ground to be raked up later and burnt when they dry. This drying out takes time and most growers do not attempt to disc until after this operation. It has been found, however, that it pays to disc immediately after the cutting and to rake the tops at a later date. In some areas, notably at Babinda, these tops often are not burnt but are raked into convenient drills and left. Other farmers open a furrow in the interspace and rake tops into this furrow. This, of course, is only possible where there is good soil moisture.

Loose Stools.—In fields where many stools have been damaged by grubs and are loose in the ground, a different technique in ratooning is required. In this case it is necessary to consolidate the stools in the soil. This may be done by rolling with a roller or tractor wheels and then throwing soil on to the stool with the cotton king or some such implement, after which it may be necessary to roll again. However, with the use of benzene hexachloride to control grubs and the breeding of new varieties of cane which are replacing unsatisfactory ratooners, this problem should be much less troublesome in the future. Nevertheless for stools in light or sandy soils care will still be needed in the use of disc harrows.

Grubbing.—As previously stated, it is necessary to have the soil in good tilth so that it will retain any rain that may fall and to allow root development. This may usually be done quite efficiently by means of a grubber—a good grubbing will bring the land into good tilth without causing the loss of moisture that usually accompanies ploughing away. The depth of grubbing and the time at which it is done are also dependent on the soil and moisture. On some of the whitish clay soils of the district it is often impossible to grub until rain has fallen owing to the hardness of the land. It is fatal to grub deeply in dry weather, when the soil turns up in huge lumps, leaving large air passages throughout the soil, and in such a case it is preferable to make the process in two operations, the first grubbing being as deep as the moisture condition of the soil will allow, whilst the second and deeper grubbing may be carried out after sufficient rain has fallen.

Hilling Up.—The hilling up of ratoons has much to recommend it, particularly with varieties that are surface rooters. This practice is generally adopted for the last ratoon prior to ploughing out.

Legumes.—A novel method of handling ratoons is used by a number of growers in the Babinda district, where after a block has been ratooned, legumes, usually cowpea, are sown in the inter-spaces [2]. This practice is gaining favour and in this wet area has much to recommend it. In the first place, it reduces the cultivation necessary and smothers the weeds, while on creek banks and places liable to flooding it greatly reduces the danger of soil erosion. Growers on land subject to flooding are dubious of scarifying young ratoons for fear that a heavy storm may result in all the loose soil going down the creek. There is also the advantage of the nitrogen gained by growing these legumes.

Fertilizing Ratoons.—In fertilizing ratoons the universal practice is to apply a ratooning mixture as soon as possible and later to top dress with ammonium sulphate. There seems to be no reason why, in many areas in the north of Queensland, the nitrogen cannot be incorporated in the ratooning mixture and the whole of the plant food requirements be applied in one operation. The separate application of ammonium sulphate later seems to have evolved from the desire to avoid loss of fertilizer by leaching before the plant developed sufficiently to utilise the heavy application of nitrogen. The general practice is to apply ammonia as a top dressing some weeks after the initial ratooning mixture, but as this period coincides with the driest time of the year, the danger of leaching is probably very small. Results of experiments in Hawaii [1] regarding the number and time of applications of nitrogen suggest that under certain conditions nothing is lost by applying the whole of the nitrogen in one dose at the start of the crop. The advantages of applying the whole of the fertilizer requirements in one operation are obvious from the point of view of production costs.

(1) BORDEN, R. J.: 1946-1947. Reports of Committee in charge of the Experiment Station, Hawaii.

(2) DICKSON, S. W.: 1941. Experiments in the Growing of Poona Pea Amongst Sugar Cane. Proceedings Q.S.S.C.T. Twelfth Annual Conference.

Frenchi Grub Control in North Queensland.*

BY G. WILSON.

WHILE satisfactory control of the greyback grub was achieved firstly by soil fumigation with carbon bisulphide and more recently by the use of B.H.C., the control of frenchi grubs by fumigation methods was unsatisfactory and the use of B.H.C. against the same pest is still almost entirely in the experimental stages.

The results of fumigation of frenchi grubs with carbon bisulphide have been assessed by Buzacott [1] and the habits of the beetle and larvae have been described by Mungomery [2] insofar as they lend themselves to control by means of cultural practices. These latter are still very important methods of avoiding serious frenchi damage at the present stage of progress with other controls.

The occurrence of frenchi grubs in sugar cane crops presents several aspects from the control point of view since the life history of the beetle covers two years. Beetle emergence takes place from November to early January according to seasonal rainfall. Egg laying, shortly after emergence, may occur in plant or ratoon cane crops, legume cover crops, or grass fallow. The young larvae in the first and second stages inhabit the cultivated top soil until the end of May, or later if the beetle emergence has been delayed and good soil moisture is maintained by late autumn rain. After the end of May the larvae descend into the subsoil and go through a resting period at depths below plough level until mid-spring. The grubs then assume the third stage and burrow upwards during September or October and immediately commence destruction of the cane roots at a very critical period when soil moisture is usually low. The return of the grubs to the top soil is erratic since moisture and temperature appear to be stimulating factors and light spring showers may initiate a return to the top soil. However, in a prolonged dry spring, this upward movement may not be completed by the whole field population until possibly as late as December. The large grubs will continue damaging the roots for five months or so, commencing their return to the subsoil about the beginning of March, and by May and June they are seldom encountered above plough depth. Pupation takes place in October, followed by transformation into the adult beetle in time for emergence from November onwards when sufficient rain has fallen.

The various modes of occurrence of frenchi damage can be clearly understood if it is kept in mind that the young larvae develop in cane or cover crops during portion of one season and they return in the third stage the following spring to cause their greatest damage.

When cane land is under legume crop or grass fallow it is usual, if the wet season permits, to initiate ploughing between late March and early May and plant before mid-June. Large numbers of the young grubs are then damaged by ploughing while others are exposed to insectivorous birds; the population is substantially reduced and few survive to return as third stage grubs in the plant cane. Early planting enables the cane stool to establish a substantial root system before

* Paper presented at the Ayr Conference of Cane Pest and Disease Control Boards, May, 1950.

the few survivors commence to destroy the roots, and damage under such circumstances is rarely serious. Consequently, early ploughing and planting is very desirable in land subject to frenchi attack. This most important and least costly of controls is so much a normal procedure of cane cultivation that the canegrower may reap the benefit of it over a number of years without appreciating its significance.

If ploughing is delayed by a late wet season or through other difficulties till after the end of May, then a substantial portion of the grubs will be resting below plough depth and these will survive and return to attack the young plant crop in October; further, the late planted cane will have a less extensive root system when the grubs commence feeding and the damage may be considerable. If circumstances arise in which an early versus a late ploughing and planting programme has to be considered the relative importance of frenchi in any one field could be assessed to some extent by examining the fallow soil for young grubs in March and April. Since frenchi can be patchy in occurrence and yet serious, any examination carried out needs to be sufficiently thorough to supply the information desired and hand digging could be eliminated by running plough furrows through the soil at intervals of a chain or so.

Experiments with B.H.C. against third stage frenchi attacking plant cane have been carried out in the field over the last four years. Areas were used which had previously been subject to very severe frenchi damage, but owing to a drastic reduction in frenchi populations brought about by seasonal conditions very few of the trial sites have carried sufficient frenchi to yield evidence regarding the quantity of B.H.C. necessary to control the third stage grub. The evidence available from a few of the experiments has indicated that if the B.H.C. is applied in the half open drill after the cane has stooled, as is normal for greyback control, the quantity required is much greater than is necessary for greybacks, and is almost certainly in excess of 200 lb. per acre of 10 per cent. B.H.C. (1·3 per cent. gamma B.H.C.). In fact, considerable frenchi damage took place in November in a field of re-plant cane on which the canegrower had applied 200 lb. per acre of 10 per cent. B.H.C. in September when there was only two inches of sandy soil cover on the plants. This occurrence emphasises the fact that ploughing out and replanting in the same season which is an undesirable canegrowing practice at any time, is especially so in frenchi country since the small plant stool is likely to be killed out by third stage grubs which have developed from the young larvae sheltering in the subsoil while the ploughing and replanting were in progress. Since it is apparent that high concentrations of B.H.C. are necessary against third stage frenchi current experiments aim at obtaining a high local concentration in a strategic position by placing the B.H.C. in the drill at planting time.

Very successful control of frenchi has been obtained with B.H.C. under conditions of infestation which commonly occur, that is when the larvae develop in the plant crop and return in the third stage to destroy the first ratoons. In 1948 a field trial was laid down in which 10 per cent. B.H.C. dust (1·3 per cent. gamma B.H.C.) was applied in the half open drills at the end of September when the young plant cane was about two feet high. The dust was applied in a strip of eighteen to twenty inches total width.

The plant crop was not visibly grub-damaged in any way, but young frenchi larvae developed there in large numbers. In the first ratoon crop damage by third stage frenchi commenced to show during the first week of November, 1949, as a slight wilting of a few stools. By

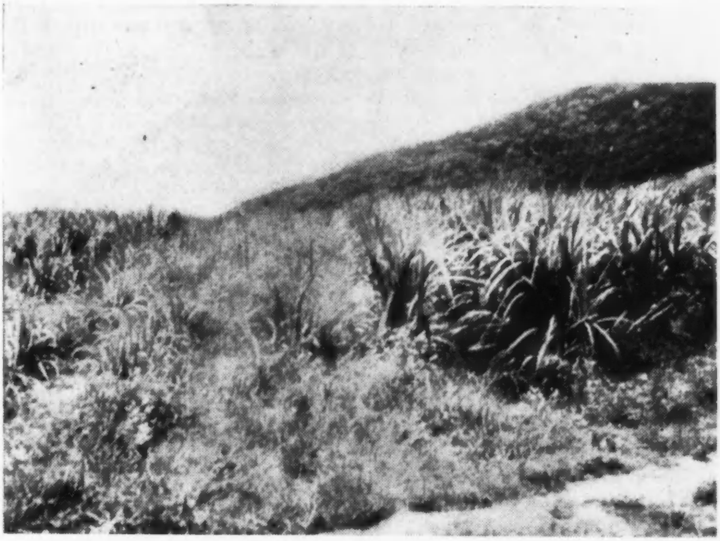

Fig. 38.—Successful control of frenchi grub with B.H.C. applied at 150 lb., 10 per cent. dust per acre. Treated plots on both sides and untreated strip in centre, which subsequently became overgrown with weeds.

mid-January, in spite of good rains, the damage (see Fig. 38) had progressed to the extent that it was obvious that no crop would be harvested from most of the untreated areas, whereas the successful treatments of 150 lb. per acre or more of 10 per cent. B.H.C. will yield probably twenty-five tons of cane per acre. The infestation in the untreated control plots ranged from four to twenty-six third stage frenchi per three feet of cane row. According to observations made in March, 1950, the results from plots treated with 10 per cent. B.H.C. dust (1·3 per cent. gamma B.H.C.) are as follows:—

200 lb. per acre—No visible damage; excellent crop.

150 lb. per acre—No visible damage; excellent crop.

100 lb. per acre—Damage in a few patches but considerable protection. Crop not as good generally as from heavier treatments.

50 lb. per acre—Very considerable damage. Slight protection, poor crop.

Untreated cane—No crop on four of five plots. Fifth plot, stools still alive but would be ploughed out normally as uneconomic to harvest; heavy weed growth throughout.

The northern Babinda area in which this trial is situated receives heavier rainfall than many areas in which frenchi is common and it remains to be seen whether similar results can be reproduced with equally heavy infestations in the drier areas.

Frenchi infestation may be initiated in first ratoons with subsequent damage in the second ratoon crop. The progress of our experimental work has not yet indicated the quantity of B.H.C. that is necessary as a plant application for residual control to be effective. In such an instance further information on frenchi control by chemical means must await the results of work now being carried out with B.H.C. and other new organic insecticides of quite recent origin.

REFERENCES.

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(2) R. W. MUNGOMERY. Cane Pests Boards' Conference Proceedings. Cane Growers' Quarterly Bulletin, VOL. IX, No. 2, 1941.

SEEDLINGS FOR LOWER BURDEKIN EXPERIMENT STATION.

In order to avoid any delay in the planting of first-year seedlings at the new Burdekin Sugar Experiment Station due to the temporary lack of a glasshouse, it was decided this year to germinate the required number of seedlings at Meringa and rail them to Ayr.

Accordingly the necessary seed was planted in the Meringa Glasshouse during harvest and sufficient seedlings were raised to allow of a planting of some 3,000 to be made at Ayr.

The flats of seedlings were crated when some six weeks old and sent by rail to Ayr. On reaching the Burdekin Station the seedlings were transplanted into pots whence they will in due course be transplanted to the field.

The accompanying photograph shows the young seedlings in crates ready for transport. J. H. B.

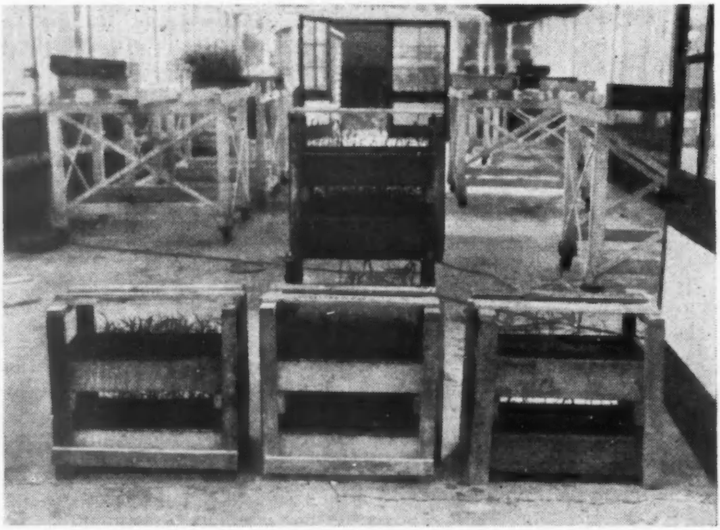

FIG. 39.—Young cane seedlings in crates ready for transport.

The Effect of Soil Applications of Benzene Hexachloride on C.C.S.*

By G. WILSON.

Introduction.

Benzene hexachloride is applied to cane lands in Queensland in the form of 10 and 20 per cent. B.H.C. dusts (containing respectively 1·3 and 2·6 per cent. γ B.H.C.) to control white grubs. Some of the rates of application used to date have ranged from 75 to 200 lb. per acre of the dust containing 1·3 per cent. γ B.H.C., and cane growers have enquired on several occasions whether these applications reduce the C.C.S. of the cane.

Discussion.

Many executives of the sugar industry in Queensland have inferred from years of observation that a slight attack by greyback grubs may cause a rise in the C.C.S. of cane harvested early in the season. It is generally accepted that this is brought about by early cessation of growth due to the pruning of the roots by the grubs. A serious loss of sugar takes place, however, when grub damage is moderate or severe and this loss increases if harvesting is delayed. Although the belief regarding the increase in sugar content has never been proved, to the writer's knowledge, by accurate field trials, its assumption is reasonable. An application of B.H.C. may eliminate very light grub infestations which would cause a rise in sugar content, the loss being offset to a greater or less degree by the increased yield of cane.

Observations from Trials.

In Table I. is presented a summary of all the available results from relevant trials. In the preparation of this information the degree and extent of the damage has not influenced the selection in any way. It stands to reason that if B.H.C. *per se* has a deleterious effect on C.C.S. it should show where grubs were present in small numbers. This may be inferred from the similarity in the yields.

In Table I. the treatment with B.H.C., yield, date of harvesting and C.C.S., are shown for each trial. The average results for trials with treatments at the rates of 75, 100, 150 and 200 lb. per acre are given in Table II. Since these rates of application do not occur in every trial, the averages for the untreated cane have been compiled from the results of the trials in which the respective rates of treatment occurred.

The effects from applications made to plant cane only are shown the protection in ratoon crops being due to residual B.H.C. Therefore in Table II. only the averages for plant cane on which the B.H.C. was freshly applied are shown separately. The inclusion of the results for the ratoon crops in this Table in no way alters the trend of the results. In every case the C.C.S. was higher in the cane treated with the B.H.C.

* Paper presented at the Cairns Conference Q.S.S.C.T., April, 1950.

TABLE I.

Trial Number.	Class of Cane.	Date Harvested.	Lb. per acre 10 per cent. B.H.C.	Tons Cane per Acre.	C.C.S.
1	Plant	14–10–47	0	27·0	16·66
			100	28·1	16·25
			150	28·8	16·56
			200	28·8	16·19
1	First Ratoons ..	16–8–48	0	27·5	15·75
			100	34·1	15·22
			150	35·8	15·46
			200	34·9	15·77
1	Second Ratoons ..	4–7–49	0	10·2	13·53
			100	17·7	14·60
			150	20·1	14·41
			200	20·7	14·69
2	Plant	28–7–48	0	28·1	15·66
			50	30·4	15·96
			75	29·9	15·96
2	First Ratoons ..	22–7–49	0	15·7	15·12
			50	18·5	15·82
			75	19·6	14·95
3	Plant	15–6–48	0	28·1	13·18
			50	28·4	12·89
			75	29·0	13·53
3	First Ratoons ..	20–6–49	0	8·6	14·52
			50	12·6	15·03
			75	13·2	15·12
4	Plant	24–9–48	0	37·1	16·37
			50	42·46	15·65
			75	43·0	16·27
			100	42·6	16·71
5	Plant	2–9–48	0	34·6	16·06
			50	33·1	16·69
			75	34·92	16·54
			100	35·5	16·81
5	First Ratoons ..	26–9–49	0	14·7	18·22
			50	21·7	18·98
			75	21·3	18·86
			100	24·8	19·69
6	Plant	3–11–49	0	21·0	17·89
			100	23·9	18·57
			200	25·6	18·44
7	Plant	23–8–49	0	22·7	16·56
			75	29·5	17·62
			100	30·3	17·52
			125	30·1	17·76
			150	28·5	17·58
8	Plant	11–7–49	0	22·4	14·49
			75	31·7	15·07
			100	32·1	14·45
			125	30·1	16·03
			150	30·8	15·80
9	Plant	11–10–49	0	20·8	15·5
			100	27·5	18·76
			200	27·4	18·62
10	Plant	2–8–49	0	23·3	14·10
			75	26·7	17·06
			100	28·1	16·86
			125	28·3	16·95
			150	26·3	17·17

TABLE II.

Class of Cane.	Lb. per Acre. 10 per cent. B.H.C.	Tons Cane per Acre.	C.C.S.
Plant	0 75	28·0 32·1	15·20 16·01
Plant and Ratoons	0 75	23·8 27·9	15·39 16·10
Plant	0 100	26·1 31·0	15·95 16·99
Plant and Ratoons	0 100	24·9 29·5	15·89 16·86
Plant	0 150	23·8 28·6	15·45 16·78
Plant and Ratoons	0 150	22·2 28·4	15·18 16·16
Plant	0 200	22·9 27·3	16·68 17·75
Plant and Ratoons	0 200	21·3 27·5	15·87 16·74

It is concluded that although the cane grower may on some occasions lose the benefit of a higher C.C.S. in cane suffering a very light grub infestation and harvested early, in general the overall return from grub damaged cane is far less than that from cane in which the grubs have been controlled with B.H.C.

The Control of Cane Grubs with Benzene Hexachloride in the Mulgrave District.*

By P. VOLP.

Introduction.

THE use of benzene hexachloride (B.H.C.) has gained wide favour amongst cane growers during the last three years as a means of controlling the greyback grub (*Dermolepida albohirtum* Waterh). This insecticide, when applied to fields in accordance with recommendations of the Bureau of Sugar Experiment Stations, has proved successful in preventing the damage formerly caused by this grub. The increase in the quantity of the chemical used by growers in the Mulgrave area is remarkable when one bears in mind the fact that its first small field trial against greyback grubs was established by the Bureau at the end of 1945. The spectacular control achieved in this initial trial was further substantiated by trials on a larger scale in the 1946-47 crop. The success of these experiments received wide publicity and recommendations regarding the method and rate of application were made by the Bureau. On the basis of these recommendations several growers in various sections of the Mulgrave district applied the insecticide to fields of young plant cane in 1947 and to young plant and ratoon cane during 1948. The success of these large scale applications was so convincing that 259 tons of 10 per cent. benzene hexachloride dust have been ordered for application to Mulgrave fields for the 1950 harvest. If allowance is made for complete treatments and supplementary dressings this should be sufficient to protect approximately 5,000 acres of cane land.

Greyback Infestation and Control, 1943-1949.

Prior to the advent of benzene hexachloride the main methods used in attempts to control the grub pest were the fumigation of the soil with carbon bisulphide and payment for beetles collected during the flighting period. In Table I. are shown the acreages infested and the control methods used in the Mulgrave area during the seven years 1943-49 inclusive.

TABLE I.

Crop.	Acreage Infested.	Acreage *Fumigated.	Acreage Treated with B.H.C.	Beetle Collections.
1942–3	2,000	140	nil	nil
1943–4	3,900	217	nil	nil
1944–5	500	228	nil	nil
1945–6	3,000	130	nil	nil
1946–7	Very light and patchy	7	nil	3 tons
1947–8	1,200	25	440	3 cwt.
1948–9	3,300	80	1,562	nil

* Treated with carbon bisulphide and/or paradichlorbenzene.

The fluctuation in the area infested during this period is very marked. It indicates the rapidity with which the grub pest is capable of increasing to alarming proportions and how their numbers may suddenly decrease due to the partial and in some instances almost

* Paper presented at the Cairns Conference Q.S.S.C.T., April, 1950.

complete destruction of the pest through natural agencies. In 1945 the infestation was light, but a rapid increase in population occurred in 1946, which was exceptionally dry during the winter, spring and early summer months. Although large flights of beetles took place during January and February of 1947, the acreage infested in that year was very small and grub damage only slight, due to unfavourable climatic conditions.

During January and February of 1947 three tons of beetles were collected and destroyed. These beetles emerged from the 3,000 acres of infested cane lands and the neighbouring grass and bush lands, and the total emergence was conservatively estimated at 30 tons of beetles. The remaining 27 tons of beetles which were not collected should have been sufficient to increase considerably the area infested in 1947 had climatic conditions been favourable. There was a rapid change from the light and patchy damage in 1947 to the rather heavy damage in 1948—as evidenced by the infestation of 1,200 acres. This figure was increased in 1949 to 3,300 acres, to which must be added 2,000 acres which were treated with B.H.C. Most of this treated area would undoubtedly have been infested with grub if control measures had not been used. These areas indicate that increases in population which occur under favourable climatic conditions such as were experienced during the spring and summer of 1947 and the summer months of 1948-9.

In past years the area treated with carbon bisulphide alone or in a mixture with paradichlorbenzene was generally only a small percentage of the total infested acreage. This was due partly to the high cost of the fumigants, partly to the scarcity of suitable labour, and partly to the short optimum period during which fumigation could be carried out before the cane suffered damage. Only partial control was generally obtained in the treated areas, but further extensive damage to the stools was prevented and a reasonable stand was obtained in the resulting ratoon crop. Thus the control of the greyback grub by means of fumigation was not popular and the effectiveness of B.H.C. as a means of control was warmly welcomed by all growers in grub infested areas.

The Use of Benzene Hexachloride on a Farm Scale.

The benzene hexachloride used in the Mulgrave area consisted mainly of a dust containing 10 per cent. of crude B.H.C. and 1.3 per cent. gamma isomer, whilst a smaller quantity of the 20 per cent. product was also used. The main fillers used were pyrophyllite and rock phosphate.

In 1947, 644 acres of cane were treated with 10 per cent. B.H.C dust at an overall average rate of 85 lb. per acre. The lowest application rate was 50 lb. and the highest 100 lb. per acre. The applications were made during the months of October, November and December prior to the emergence of the beetles which took place in January, 1948. The applications were made by means of fertilizer distributors of the standard types and that devised by the Mourilyan Junior Farmers' Society or by hand in a band up to 10 inches in width on each side of the cane row. The insecticide was incorporated in the soil by scarifying at least twice after the application was made. The control obtained from the use of the insecticide exceeded the expectations of the growers and

some outstanding increases in tonnage were registered when compared with adjacent untreated areas. In addition to the extra yield from the plant crop the vigour of the treated cane in ratooning was also far better.

Fig. 40.—A view of a field of first ratoons. The section on the left was treated with B.H.C. in the plant crop while that on the right untreated.

In Fig. I. is shown the young first ratoons in a 14 acre field of Cato, photographed during February, 1949. In the plant crop the field on the left hand received an overall rate of 82.5 lb. per acre during November, 1947, whilst that on the right was not treated. The treated area harvested in July, 1948, yielded 35 tons per acre, whilst the untreated portion yielded 27 tons per acre. The portion previously treated received another treatment of 45 lb. per acre as first ratoons, whilst the other section once again did not receive treatment because of the poorness of the ratoons. The latter crop had to be harvested in June owing to serious grub damage and yielded only 11 tons per acre, whilst the crop which had been treated was cut in October and produced 30 tons per acre. In addition a second ratoon crop is now growing very well on the land, while that on the untreated area had to be ploughed out. For an outlay of £5 12s. 6d. per acre, which represents the cost of the 127½ lb. of 10 per cent. B.H.C. dust applied over a period of two crops, this grower showed a gain of 27 tons of cane per acre and a crop of second ratoons yet to be harvested.

Of the 644 acres treated during 1947, only in a 3½ acre field of Badila on one farm was the control not wholly effective. In this instance an application of 88 lb. per acre was made during October in accordance with recommendations. However, at a later date the soil was worked away from the stool towards the interspace and was left in that position. Some grub damage subsequently developed, thus indicating clearly that the insecticide had been removed from the area in which protection was most required.

From the middle of August, 1948, until the end of January, 1949, 1,562 acres were treated with 10 per cent. B.H.C. dust. Of this area, 1,046 acres carried plant cane and received treatment at an average rate of 90 lb. per acre, while 338 acres of ratoons received an average of 80 lb. per acre and 178 acres of first ratoons received a "booster" treatment of from 40 to 70 lb. per acre. During the last three weeks of January, 1949, some 227 acres of plant cane were treated by hand applications, whilst the majority of the beetles were still on the wing, and in all areas treated the control was effective. The areas in which late hand-applications were made showed satisfactory control, despite the fact that the insecticide was applied on the surface and only partly incorporated in the soil by a single scarifying. Likewise, in the ratoon areas treated, the insecticide was mostly applied on the surface and mixed with the top layer of soil by means of grubbing or discing. The application of B.H.C. on the surface is not recommended, however, despite the fact that for two years in succession good results were obtained by several growers who applied it in that manner. This successful control may have been due to the fact that in both 1948 and 1949 the moisture of the soil during the late summer and autumn was exceptionally good, with the result that the grubs fed up to the surface of the soil, thus coming into contact with the insecticide. This would not have been the case had dry conditions pertained during their active feeding period.

The booster applications to first ratoons, which were previously treated in the plant crop with a range of from 70 to 100 lb. per acre, indicated that these retreatments were warranted since increases in yield were recorded and vigour was maintained in the second ratoons. Fig. 2 shows a field of Badila first ratoons which received 92 lb. of 10 per cent. B.H.C. per acre in November, 1947. On the left of the photograph is the portion which received a booster treatment of 40 lb. of 10 per cent. B.H.C. per acre in early December, 1948, whilst the cane on the right of the picture received no further treatment. It was estimated that the crop on the portion which received treatment was at least five tons per acre heavier than that on the untreated land. This farm was subjected to a heavy infestation, and the photograph shows clearly that the residual effect from the plant application was not sufficient to give effective control in the second year after treatment. This instance confirms the results obtained from experiments laid down by the Bureau in 1946, which showed that a treatment of 100 lb. per acre was not sufficient to ensure effective control for the two subsequent ratoon crops. On a number of other farms where infestation was not heavy the residual control from plant cane applications of approximately 90 lb. per acre was quite good in the first ratoon crops. In most instances in the earlier applications the insecticide was applied in bands approximately 10 in. wide on both sides of the cane row, but in order to obtain a greater concentration of B.H.C. around the stool the width of the band has been reduced from 10 in. to 4 in. or less.

The success of benzene hexachloride as a means of controlling the greyback grub appears to be largely governed by the method, rate and time of application and by the subsequent cultivation. The present indications are that the distribution of the insecticide should be in equal quantity on both sides of the row and placed in such a position as to give as complete coverage as possible to the stools. Applications to

FIG. 41.—Illustrating a field of first ratoons in which the cane on the left received a booster treatment and that on the right received no additional treatment.

plant cane are ideal for achieving this objective and should be carried out immediately after the grower has completed all cultivation which moves the soil away from the stool. After applications are made all future cultivation should be planned to work the soil on to the stool.

Comparison between B.H.C. Treatment and Soil Fumigation.

An instance where B.H.C. treatment and carbon bisulphide fumigation were used on adjacent portions of a field of Comus occurred during the 1948-49 season, with interesting results. Two acres which were treated with carbon bisulphide at the rate of 12½ gallons per acre yielded 17½ tons of cane per acre. From the adjoining 2·4 acres, which was treated with 10 per cent. B.H.C. at the rate of 86 lb. per acre, 25 tons per acre were harvested. This increase of 7½ tons per acre will not be the only gain from the treatment with B.H.C., since the ratoons from the area fumigated with carbon bisulphide now show numerous gaps and weak stools whilst a vigorous and perfect ratoon stand is showing on the portion treated with B.H.C.

Summary.

(1) The successful control of the greyback cane beetle (*Dermolepida albohirtum* Waterh.) in the Mulgrave area by means of benzene hexachloride is discussed.

(2) The benzene hexachloride is applied in the form of a 10 per cent. or 20 per cent. dust which is distributed in a narrow band on either side of the row of young cane. It is recommended that this operation be carried out immediately before the furrows are filled in by cultivating implements.

(3) Results at various rates of application are discussed, and the insecticide is shown to have a good residual effect.

(4) An example of the superiority of benzene hexachloride over carbon bisulphide soil fumigation is given.

The Attaining and Maintenance of Soil Fertility in the Tully Area.*

BY LABORATORY STAFF, TULLY MILL.

Introduction.

THE intention in presenting this paper to conference is to indicate how a valuable though inexpensive service may be given to a group of canegrowers by the chemical staff of a mill working in direct conjunction with the Bureau of Sugar Experiment Stations. The amount of work involved, as will be seen from this report, is considerable, and for the Bureau alone to attempt to give such a service to all the canegrowers of Queensland would involve a very large increase in its present staff.

An endeavour has been made over the last three seasons to obtain an analysis of soil from every plant block harvested in the Tully area. This involved five to six hundred samples of soil per season. As each sample represents some 6·5 acres of land, an area of about three and a-half thousand acres was covered each year. It is intended that the entire area be completely surveyed for soil requirements by the completion of the 1952 crushing season. This does not mean that the work will then cease, as fertility must be maintained and a recommendation for one cycle is not necessarily the most suitable one for the succeeding cycle. Further, as scientific advancement occurs, it may be possible to refine and improve past recommendations.

The analyses performed on the soil samples include the determination of coarse matter, pH, phosphates, potash, and total replaceable bases. These constitute the requirements upon which the Bureau officers are able to base their recommendations, which are, in turn, based upon the results of a large number of practical field trials conducted by the Bureau. It may be as well to mention here that the Bureau has found that recommendations for fertilizer requirements are most reliable when based upon analyses made on soils taken from a field of either mature plant cane or one from which plant cane has just been harvested.

Method of Survey.

There are two alternative methods of conducting such a survey. Originally it was anticipated that this work would be an ideal and profitable manner in which to employ mill chemists during the slack season. It was thought that the requisite plant fields could be sampled during the crushing season and the samples analysed during the off season. This method has one distinct drawback in that the recommendations are not available until the second ratoon crop. In all probability more plant foods would have been removed from the soil by the first ratoon crop, so that the recommendations would fall short of requirements and prove of less value. It was therefore decided that, to perform this survey with satisfaction, it would be essential to make available to growers the recommendations for their first ratoon crop in sufficient time to enable them to procure the necessary fertilizer. This naturally meant that each individual analysis had to be made as soon as possible after harvesting, and necessitated the employment of a

* Paper presented at the Cairns Conference Q.S.S.C.T., April, 1950.

Soils Chemist during the crushing season. The authors consider it preferable to increase the mill staff, rather than incur a prolonged delay in reporting results which are then less profitable to the farmer.

Procedure.

In dealing with the procedure which has been adopted by Tully mill, it is first of all necessary to refer to the general set-up of the farms in this area. A master plan has been made of all farms in the area, and a fresh copy is taken each year. Each farm has been given a classification number, a practice which has been found essential for the tabulation and correct utilisation of the analytical results. Also all samples have been numerically classified.

The procedure adopted for the sampling, analysing, recording, interpreting and recommending which proceeds with each sample is as follows. At the commencement of each crushing the soil sampler prepares a field book which contains a list of all blocks of plant cane to be harvested during that season. As these blocks become harvested, which advice is received from either the farmer or the cane inspector, he indicates on a copy of the master plan the farms on which fields are now available for sampling. This eliminates unnecessary travelling and so reduces lost time and running costs. He then waits, if possible, until there are sufficient fields within a limited area, so that several may be sampled in one trip. Without a master plan this method of sampling would be practically impossible and costs would increase unnecessarily.

The sample officer then proceeds to the area, and on arrival at each field, carefully considers the type of country, the apparent drainage and the soil type or types. He also examines the sub-soil, when possible —and it often is possible in the Tully area. From the farmer the officer also ascertains the average yeild of cane; whether green manuring was practised or not; what has been the usual practice with fertilizers; whether the soil has been limed during recent years; and any other points of interest that the farmer alone can supply. All this detail is entered on a "Field Report Sheet." He then proceeds with the sampling in accordance with the standard method set down by the Bureau. This consists of boring with a 1½ inch bull nose auger to a depth of 10 inches. If the surface soil is shallower, or if the practice of the farmer is to cultivate less deeply, sampling is restricted accordingly. A sample plate has been devised for use in soils which do not cling within the twists of the auger. This plate collects the sample as it is passed upwards by the auger.

For those not acquainted with the fact, samples are taken in the following ratio to area:—

One sample is taken per acre on blocks exceeding 10 acres.

For smaller blocks a minimum of 10 samples is selected. Should there be two soil types in one block, then 10 samples are taken of each soil type in the block.

The samples from each field are composited in water-tight canvas bags according to soil type, labelled for identification, and transported to the laboratory. On arrival at the laboratory they are spread on drying trays (stump caps are very suitable) and air dried for 24 hours in normal weather, prior to rolling for the purpose of breaking

up all soil conglomerates. The soil is then sieved on a screen with 10 meshes per inch and the proportion of coarse matter determined. The resultant "soil" which has passed through the sieve is then placed in a 2 lb. tin with an identifying label. The laboratory identification number is then painted on the tin and the sample passed to the soils analyst, who carries out the four determinations and reports the result on the Field Report Sheet.

A copy of this Feild Report Sheet is quickly made and despatched to the Bureau, where the necessary recommendations as to fertilizer treatment are made. The Bureau then forwards to the respective farmers the recommendations and also supplies the mill with a copy of each set. In the case of a mill supplying mud and/or molasses as fertilizer, the mill is thereby enabled to determine the quantities of these by-products equivalent to the recommended commercial fertilizer, and so effect further economy for the grower. A mixture of mud and molasses is a particularly useful substitute for commercial fertilizers.

The next step is to record on the master plan, as time permits, the results of these analyses. With the aid of this plan one is quickly able to determine the degree of fertility in relation to pH, phosphate and potash in all parts of the area, and a comparison of records from year to year will indicate where any improvement or otherwise is occurring.

Analysis to Date.

In Tables I. and II. are shown the results of a detailed analysis of these master plans for the last three seasons. The Tully area is divided geographically into three sections, and use has been made of these natural subdivisions in studying the soils of the mill area.

TABLE I.

THE RESULTS OF AN ANALYSIS OF THE SOIL SURVEY TO DATE IN THE THREE PARTS OF TULLY AREA, SHOWING THE NUMBER OF SAMPLES IN EACH GRADING AS A PERCENTAGE OF THE TOTAL FOR EACH YEAR.

Analysis	Grading.	Northern.			Central.			Southern.		
		1947.	1948.	1949.	1947.	1948.	1949.	1947.	1948.	1949.
pH ..	Poor— $<4\cdot2$	38	28	33	53	32	24	76	45	52
	Fair— 4·2–4·8	54	61	64	42	63	75	19	52	45
	Good— $>4\cdot8$	8	11	3	5	5	1	5	3	3
Phosphate	Poor— <40 p.p.m.	17	39	69	26	26	53	35	26	55
	Fair— 41–60 p.p.m.	51	25	22	23	19	20	22	26	20
	Good— >60 p.p.m.	32	36	9	51	55	27	43	28	25
Potash ..	Poor— $<0\cdot12$	79	73	69	49	76	53	15	51	31
	Fair— 0·13–0·18	15	24	24	29	18	20	35	36	31
	Good— $>0\cdot18$	6	3	7	22	6	27	50	13	38

TABLE II.

RESULTS OF THE SURVEY FOR THE WHOLE TULLY AREA.

—	pH.			Phosphate.			Potash.		
	1947.	1948.	1949.	1947.	1948.	1949.	1947.	1948.	1949.
Poor	59	38	37	28	28	57	39	63	48
Fair	35	57	60	28	24	21	29	28	27
Good	6	5	3	44	48	20	32	9	25

Up till the end of 1949, 1,542 samples had been tested representing 9,761 acres, *i.e.*, one sample per 6.3 acres. This area is only 57 per cent. of the gross assigned area. Hence it may be readily realised that to attain the requisite fertility and to maintain it within reasonable limits will involve quite a considerable amount of work. This area suffered like all others during and after the war, when lime was difficult to obtain as well as difficult to apply, but the general increase in the proportion of samples showing a fair pH may be attributed to the 1947 survey, which brought to the notice of the growers the fact there was a widespread lime requirement in the area.

It appears from Table I. that there is a definite trend in the northern and central areas towards a lack of understanding of the need for phosphate. The southern area has likewise shown a decline in the proportion of samples indicating satisfactory phosphate contents, but the trend is not as pronounced as it is in the other parts of the district.

The potash contents have remained fairly steady at definitely deficient values, and although all the molasses in this area is used almost entirely as a field dressing, the need for more potash is still evident.

Practical Results.

It must be emphasized here that although this survey has been in operation since the commencement of the 1947 season, the greatest beneficial effects will probably take several years to be realised. For example, farmer Jones, during the 1948 slack season, was advised to make certain applications on a particular block which had been sampled during the 1947 season. Due to the previously mentioned time lag before the advice was available to him it is probable that he had already applied his own selected fertilizer before receiving the recommendations. That means that his 1948 crop of first ratoons was unaffected as far as the survey was concerned, except for the lime requirement for which advice was given much earlier. However, farmer Jones should have, with a little discretion, utilised the recommendations for that block, now holding second ratoons for the 1949 season. From this it will be seen that the 1947 survey could not have achieved its full value. Furthermore, in 1948 it was not possible for one chemist to devote his full time to this work, and in consequence there was again a delay in some of the recommendations, so that the process described above would have applied to the first ratoons harvested in 1949, although certainly to a lesser degree. However, during the 1949 season steady flows of samples and recommendations were maintained, and it is anticipated that some improvement will be made for 1950 and 1951 seasons.

It must be remembered that the availability of fertilizer is the over-riding factor in all fertilizer recommendations, even with complete co-operation from the growers themselves.

Costs of Survey.

The actual costs for the work involved in the 1949 season are set out in Table III.

TABLE III.

SHOWING THE COST OF THE SURVEY FOR 1949.

Item.	Total Cost.	Cost per Sample.
	£ s. d.	£ s. d.
Wages ..	328 1 5	0 12 10
Vehicle depreciation ..	80 0 0	0 3 2
„ running expenses	25 11 5	0 1 0
„ mechanical repairs	59 7 8	0 2 4
„ tyres and tubes	34 0 0	0 1 4
„ registration and insurance	9 18 0	0 0 5
Depreciation on fixed plant valued at £163 18s. 7d.	8 3 11	0 0 4
Materials used in actual analysis	40 8 4	0 1 7
Power consumption ..	14 18 4	0 0 7
Totals ..	£600 9 1	£1 3 7

It will be observed that the vehicle was responsible for 8/3 in a total cost of £1 3s. 7d. per sample. This cost is, of course, dependent upon the type of vehicle and mileage, &c., and will vary considerably from area to area. The main reason for operating a master sampling plan was that running costs might be reduced to a minimum.

Conclusions.

Since in 1949 there was one sample to 6.7 acres, the amount of £1 3s. 7d. per sample is equivalent to 3s. 6d. per acre sampled. If growers were utilising these recommendations in full, it would mean that an increase of at least 2.9 cwt. of cane per acre must be secured to compensate the Association for the expenditure incurred in that season only. However, if this is viewed in the way that the authorities mean growers to view it, the yield required to offset this expenditure is far less. For example, recommendations are made on analyses of the soil after the harvesting of the plant crop, i.e., for the first ratoon, second ratoon and succeeding plant crops. Hence the grower may profitably utilise the recommendations for three crops and this reduces the increased annual yield required to offset the costs of sampling and analysis, Admittedly the grower must also offset the costs of fertilizer, but the survey to date has indicated that only too frequently has it been possible to reduce fertilizer costs by recommending applications which are more suitable and more economical. Thus it is difficult to determine the extra yield required to offset the costs of the recommended fertilizer treatment as compared with those of the usual applications.

Acknowledgment.

The authors desire to express their appreciation of the excellent co-operation received from officers of the Bureau of Sugar Experiment Stations and their willingness at all times to impart to the mill staff appropriate advice relative to this particular work. The authors' thanks are due to the management of Tully Co-operative Sugar Milling Association Ltd., for permission to publish the details in this paper.

The Value of Velvet Beans in the Isis District.*

By E. J. R. LUCKETT.

Introduction.

The growing of legumes on sugar cane lands has for many years been very successful in maintaining the fertility of soils which had become somewhat depleted of plant foods. Several types of legume may be grown and the choice depends largely on the time of the year in which the planting is to be made. In the case of a long fallow (say about eight months) the new velvet bean, which produces a good cover crop, is unexcelled. Some thirty years ago Mauritius beans were grown in Queensland, but they were abandoned because of the difficulty of turning the crop into the soil. However, with the recent advances in the mechanisation of farming this problem has now been overcome.

Advantages of Velvet Beans.

Velvet beans are fairly free from disease and withstand dry conditions better than most other legumes—in fact, they will grow under practically any conditions. Two varieties—Somerset and Black—are eminently suited for growing in rotation with crops of cane in the Isis District. Both give an excellent cover crop, which means that a large volume of green material has to be ploughed in, and thus a considerable amount of nitrogen is added to the soil. When planted on hillsides in September and October these legumes have provided sufficient cover when the heavy rains occurred, in January and February, to help control sheet erosion.

Suggestions for Planting the Seed.

The seed should be planted in rows 4 ft. 6 in. apart with an interval of 10-12 in. between individual seeds. When planted in this manner, 15 lb. of seed should be sufficient for one acre of land. The ordinary cane planter may be brought into commission for planting the seed, since this implement permits the seed to be placed at the required depth of 3 or 4 in. When the seed subsequently germinates this deep placement allows the young roots to develop in a zone adequately supplied with moisture. Hence the young plants are well protected against drought conditions, should a temporary dry spell occur after the plants appear above the ground.

The Harvesting of the Seed.

Besides the value of this crop in maintaining soil fertility and helping to control soil erosion, quite a good financial return may be made by harvesting the seed. The pods mature and are ready for harvesting five to eight months after planting. Many instances have been noted in the Isis District in which over 1,800 lb. of seed have been harvested from one acre of land. In one case with such a yield the cost of harvesting, threshing and cleaning the seed was £17, while the seed was sold at 1s. per lb., giving a gross return of £90. Thus a profit of £73 was made on one acre in eight months.

Although the demand for these legumes has exceeded the supply for the last two years, this position may change at any time. However, in the event of a grower having excess seed, it may be held from year to year without any deterioration if adequately protected by some insecticidal dust.

* Paper presented at the Cairns Conference Q.S.S.C.T., April, 1950.

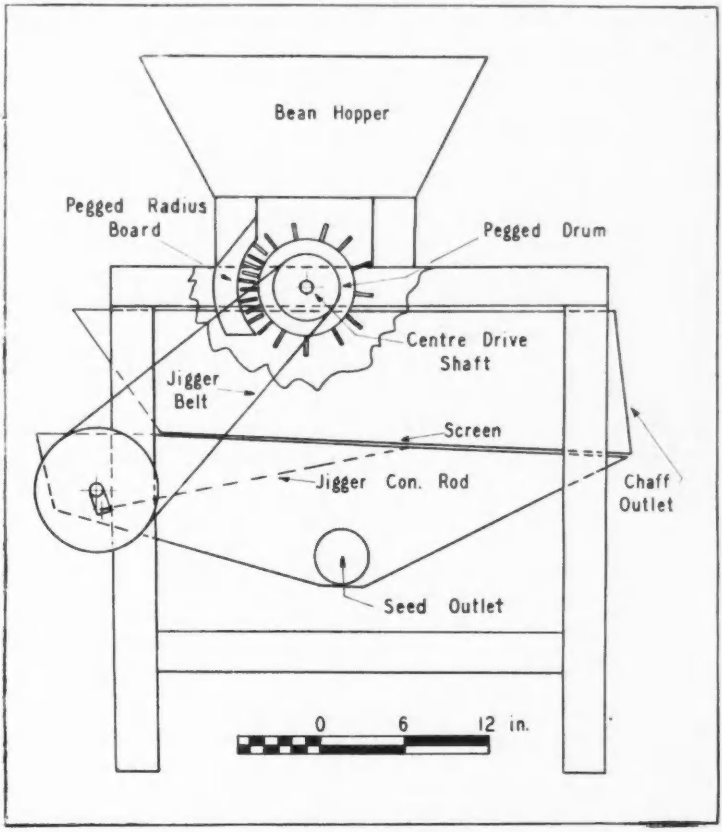

FIG. 42.—Illustrating the thresher.

The Threshing of the Beans.

The satisfactory threshing of the beans has proved difficult, although the problem appears to have been solved by the use of a thresher built by Mr. A. C. Broadhurst. This machine, of which a sketch is shown in Fig. 1, consists essentially of a rotating drum pegged with heavy 4 in. nails at about 2 in. centres, and a radius board likewise pegged with heavy 4 in. nails at about 1¼ in. centres, arranged so that the pegs are in mesh. The drum is fitted to a horizontal shaft which is supported by a substantial wooden frame, and which is driven by means of a belt from a main shaft arranged as shown in Fig. 1. Above the drum is fixed a feed hopper, while below it is placed a box, fitted with a screen of fine bird netting instead of a bottom. This box is shaken by means of a connecting rod and crank attached to the main drive shaft. The operation of this shaker is much the same as that of a corn sheller.

The beans are fed into the hopper and as they pass between the drum and radius board the pods are broken. The seed passes through the screen and collects in the bottom receiver, while the chaff passes over the screen and is discharged. The machine is capable of delivering about 400 lb. of seed per hour, and may be driven by any farm engine.

FORECAST OF APPROVED VARIETIES FOR 1951.

In accordance with usual practice, the Bureau has prepared a forecast of the changes it is proposed to make in the approved variety list of 1951. Any interested farmers' organizations which consider alterations should not be made along the lines indicated, or wish to submit any other changes, are invited to submit their views to the Director of Sugar Experiment Stations before 30th November, 1950. Any objections against varietal deletions or suggestions for additions must be accompanied by a detailed statement of the reasons for such objections or suggestions. No action can be taken in respect of late or unsubstantiated requests.

Mossman—H.Q409, Korpi and Pompey to be deleted; Q.50 and Pindar to be added.

Mulgrave—(Babinda district) Q.50 to be added. (South of Russell River) Q.50 to be added.

Babinda—Q.50 to be added.

South Johnstone—Pindar and Q.50 to be added.

Mourilyan—Pindar and Q.50 to be added.

Tully—Pindar and Q.50 to be added.

Invicta (North of Townsville)—H.Q.409, Q.10 and S.J.2 to be deleted; Q.50 to be added.

Proserpine
Farleigh
Racecourse
Pleystowe
Marian
North Eton
Cattle Creek
} Pindar to be added.

Plane Creek—P.O.J.2714 to be deleted; Pindar to be added.

Qunaba—Pindar and Q.55 to be added.

Fairymead—Pindar and Q.55 to be added.

Millaquin—Pindar and Q.55 to be added.

Bingera—Mahona to be deleted; Pindar and Q.55 to be added.

Gin Gin—Pindar, Q.55 and Vesta to be added.

Isis—Pindar to be added.

Maryborough Mill Area—Pialba district, Q.50 to be added. Maryborough district, Q.50 to be added.

Mt. Bauple—Q.50 to be added.

Moreton—Atlas to be deleted; Pindar and Q.50 to be added.

A. H. TUCKER, Government Printer, Brisbane.